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Okalia globosa, a new genus and species of Macronychini from Malaysia (Insecta: Coleoptera: Elmidae)

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Okalia globosa, a new genus and species of Macronychini from Malaysia (Insecta: Coleoptera: Elmidae). - *Okalia,* a new genus with a new species, *O. globosa* from Pahang (Peninsular Malaysia), is described and illustrated. It inhabits small rivers, preferring limestone gravel covered by a conspicuous film of algae.

Key-words: *Okalia globosa* - new genus - new species - Macronychini - Elmidae - Coleoptera - Malaysia.

INTRODUCTION

The tribe Macronychini currently contains 21 genera described mainly from South-east Asia and eastern Palearctic (Jäch & Boukal, 1995, 1996, 1997a; Jäch & Kodada, 1996a, b, 1997). Only two genera (*Zaitzevia* Champion and *Macronychus* Ph. Müller) occur in Nearctic region (Brown, 1981). No members of this tribe have so far been discovered in Afrotropical, Neotropical and Australian regions.

The elmid fauna of Peninsular Malaysia is not well known, only eight genera with 13 species have been recorded (Jäch, 1993; Jäch & Boukal, 1996, 1997b; Kodada & Čiampor, 2000). The Malaysian Macronychini are represented by three genera: *Macronevia* Jäch & Boukal, *Haraldaria* Jäch & Boukal and *Aulacosolus* Jäch & Boukal.

A short collecting trip of the authors to Peninsular Malaysia revealed several hundred elmids belonging to the following genera: *Ancyronyx* Erichson, *Aesobia* Jäch, *Aulacosolus*, *Dryopomorphus* Hinton, *Graphelmis* Delève, *Graphosolus* Jäch & Kodada, *Grouvellinus* Champion, *Haraldaria*, *Hedyselmis* Hinton, *Leptelmis* Sharp, *Macronevia*, *Ordobrevia* Sanderson, *Podelmis* Hinton, *Potamophilinus* Grouvelle, *Stenemis* Dufour, *Vietelmis* Delève, as well as a few specimens of at least two undescribed genera. One of these genera, belonging to Macronychini, is described below.

MATERIAL AND METHODS

Specimens prepared for morphological study were cleared in hot lactic acid and washed in distilled water. They were then disarticulated and studied under an Amplival microscope as temporary glycerine slides at magnifications up to 600x. Dry prepar-

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ations of other specimens were studied under a Wild M3Z stereomicroscope with diffuse lighting at magnifications up to 100x. All drawings were made using a drawing tube. For scanning electron microscopy, specimens were dehydrated in graded ethanol series and air-dried from absolute ethanol, mounted on stubs with Tempfix, sputter coated with gold and then viewed in Jeol 840 A at 10 kv.

Metric characters were measured using a Wild M3Z with ocular grid. The following measurements are presented in the text: AW – anterior pronotal width; EL – elytral length along suture; EW – elytral width, maximum width combined; PL – pronotal length along midline; PW – posterior pronotal width; TL – distance measured from anterior margin of pronotum to elytral apices.

The material examined has been deposited in the following collections: CKB – Ján Kodada collection, Bratislava, Slovakia; NMW – Naturhistorisches Museum, Vienna, Austria; MHNG – Muséum d'histoire naturelle, Genève, Switzerland.

SYSTEMATICS

Okalia gen. n.

TYPE SPECIES: *Okalia globosa* sp. n.

DIAGNOSIS. Small, widely to moderately obovate, strongly convex dorsally; surface scarcely punctate, smooth; dorsal plastron on head, anterolateral portion of pronotum and on elytra between lateral margin and fifth interval; antenna eight-segmented; labial palpi three-segmented; pronotal median groove absent; sublateral carinae of pronotum short and indistinct; femora moderately expanded; fifth elytral interval granulate nearly entirely, sixth granulate posteriorly, seventh granulate entirely; elytral striae obsolete; elytral apices obliquely truncate; lateral sides of pronotum and elytra serrate; parameres absent; penis abruptly constricted apically, with apex arrowhead-like.

DESCRIPTION. Habitus (Fig. 1). Body form in wingless specimens widely obovate, widest at elytral midlength, lacking shoulders; in winged specimens elytra subparallel-sided with shoulders prominent (Fig. 17). Plastron structures on: clypeus, frons, area posteriad of eyes, anterolateral portion of pronotum, hypomera, lateral portions of prosternum, mesepisterna, metepisterna, lateral portion of metaventrite, epipleura, lateral portion of ventrites, elytra between margin and fifth interval, anterior face of metacoxae, femora and tibiae.

Head (Figs 2-4) partly retractable, retracted portion reticulated, without plastron structures. Labrum with anterior margin fringed by row of shorter hair-like ventral setae; anterolateral portion with row of longer, erect setae; lateral tormal processes short (Fig. 21). Clypeus about as long as labrum, wider than long; frontoclypeal suture distinct, arcuate; surface finely punctate, punctures setigerous, setae adpressed. Frons with scattered small granules and setigerous punctures; eyes small, feebly protuberant from dorsal view, ellipsoidal from lateral view, longer than wide, with slightly more than 60 facets. Subantennal groove very shallow, present near anteroventral portion of eye. Antenna (Fig. 26) short, reaching posterior margin of eye, eight-segmented, capitate, with terminal segment forming abrupt club; scape short; pedicel longer, enlarged distally, with a few hair-like setae; segment 3 shorter than pedicel; segments 4-7 short,

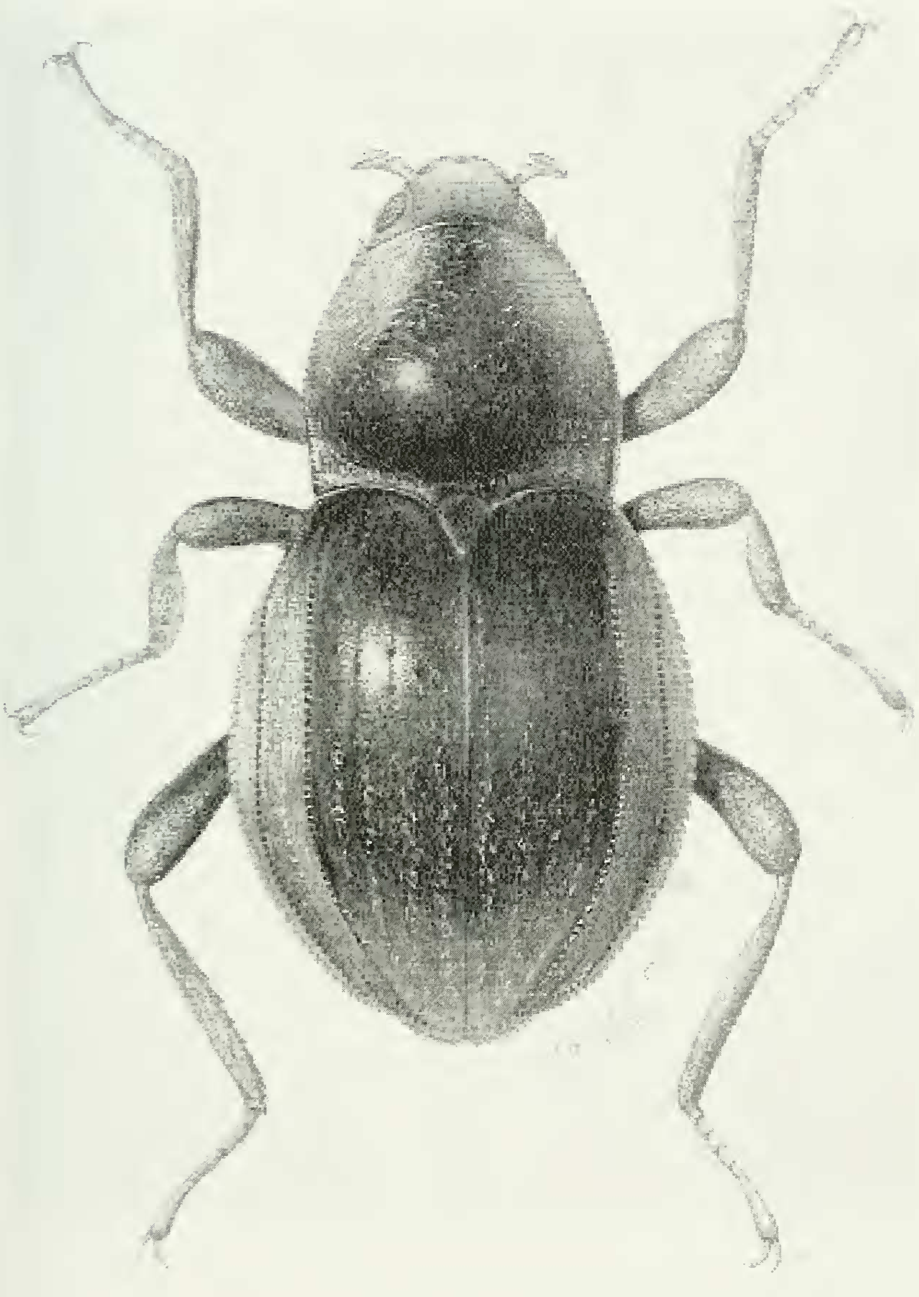
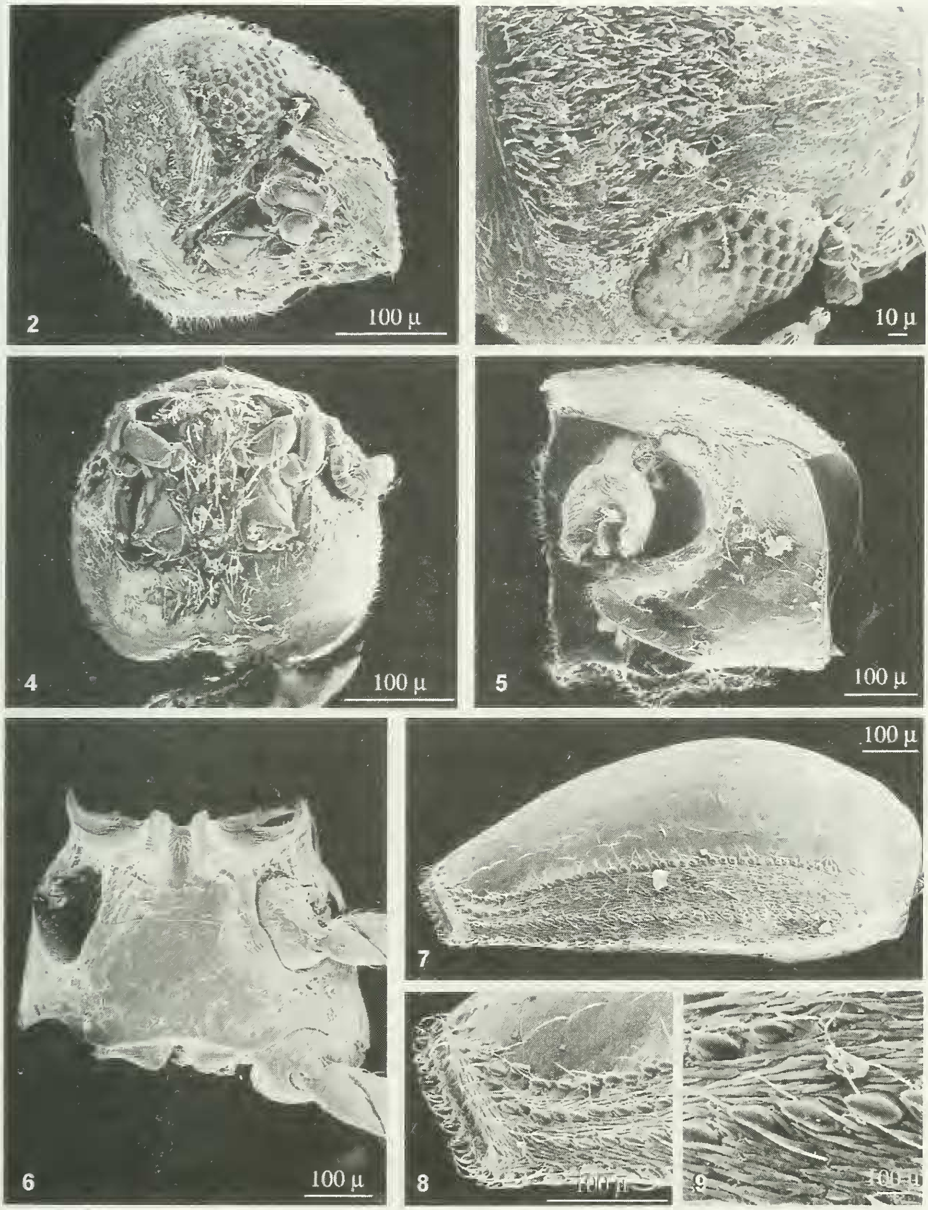


FIG. 1
Habitus of *Okalia globosa* sp. n.

wider than long; segment 8 nearly as long as combined length of five preceding segments, enlarged, with numerous setae. Mandibles (Figs 22, 23) short and wide, moderately asymmetrical each other; lateral lobe present, setose; outer outline strongly excised at apical third; apices tridentate; prostheca hyaline, with row of stronger setae mesally and with scattered thin setae apically. Maxilla (Fig. 25): exposed portion of cardo short and wide, with a few hair-like setae; stipes shorter than cardo, trapezoidal, with few setae laterally; palpifer long and narrow, with longer setae near insertion of palpus; lacinia about twice as long as wide, feebly setose ventrally, with transverse rows of dense, apically curved setae on apical portion and with moderately long setae on dorsolateral portion; galea two-segmented, proximal segment long and narrow, distal segment wider apically, flattened, with row of setae; maxillary palpus four-segmented, terminal segment longest with sensory field apically and with a few setae laterally. Labium (Fig. 24): mentum about twice as wide as long, setose, dorsal apodemes long and fused distally; palpigers fused mesally; palpus short, three-segmented, basal segment extremely short, terminal segment about as long as ligula, with sensory field apically; ligula wide, more strongly sclerotized posteriorly, anterior margin arcuate, anterolateral angles narrow and projecting posteriad. Submental region short; obvious gular sutures absent, genae meet at midline.

Thorax. Pronotum slightly wider than long, or as wide as long, widest near posterior fourth; disc convex, punctate, punctures with moderately long semi-erect setae; sublateral carinae very thin, indistinct; median groove absent; prebasal pits shallow, weakly impressed; anterior margin translucent, moderately arcuate; anterior angles acute, strongly protruding; lateral margin serrate, more strongly along anterior than along posterior half. Hypomeron (Fig. 5) widest near middle, separated by a gap from prosternum anteriorly, postcoxal projection absent. Prosternum in front of coxae about half as long as length of protibia, feebly deflected anteriad; prosternal process subtriangular, narrowed posteriad, apex nearly truncate, sides weakly and widely raised. Procoxae globular, separated by width subequal to maximum width of profemur; mesocoxae subglobular, more transverse than procoxae, intercoxal distance twice as those between procoxae; metacoxae about twice as wide as long, reaching elytra, separated each other similarly as mesocoxae; pro- and mesocoxal cavities deep; paired mesoventral procoxal rest deep, strongly oblique. Mesothorax (Fig. 6) short, strongly sclerotized ventrally and dorsally; scutellum small and subtriangular; mesoventrite short, with medial groove deep and narrow; mesepisterna fused with metaventrite; mesepimeron short, strongly sclerotized; mesoventral process with lateral sides raised. Metaventrite moderately longer than mesoventrite, flat on disc; meso-metaventral junction mesally formed by distinct suture; discrimen very fine; transverse suture absent; posterior portion with transverse row of larger punctures; exposed portion of metepisternum long and very narrow; metaventral process wide, with lateral sides raised. Metanotum well sclerotized and divided. Elytra (Figs 7-9) strongly convex dorsally, highest near anterior third (lateral view), obovate in wingless specimens, subparallel-sided in winged specimens (dorsal view); apices more or less obliquely truncate; lateral sides and apices serrate; striae obsolete, their punctures distinctly larger than punctures of intervals; surface with semi-erect moderately long hair-like setae on striae and intervals, and with a few scattered longer and thinner setae on plastron area;

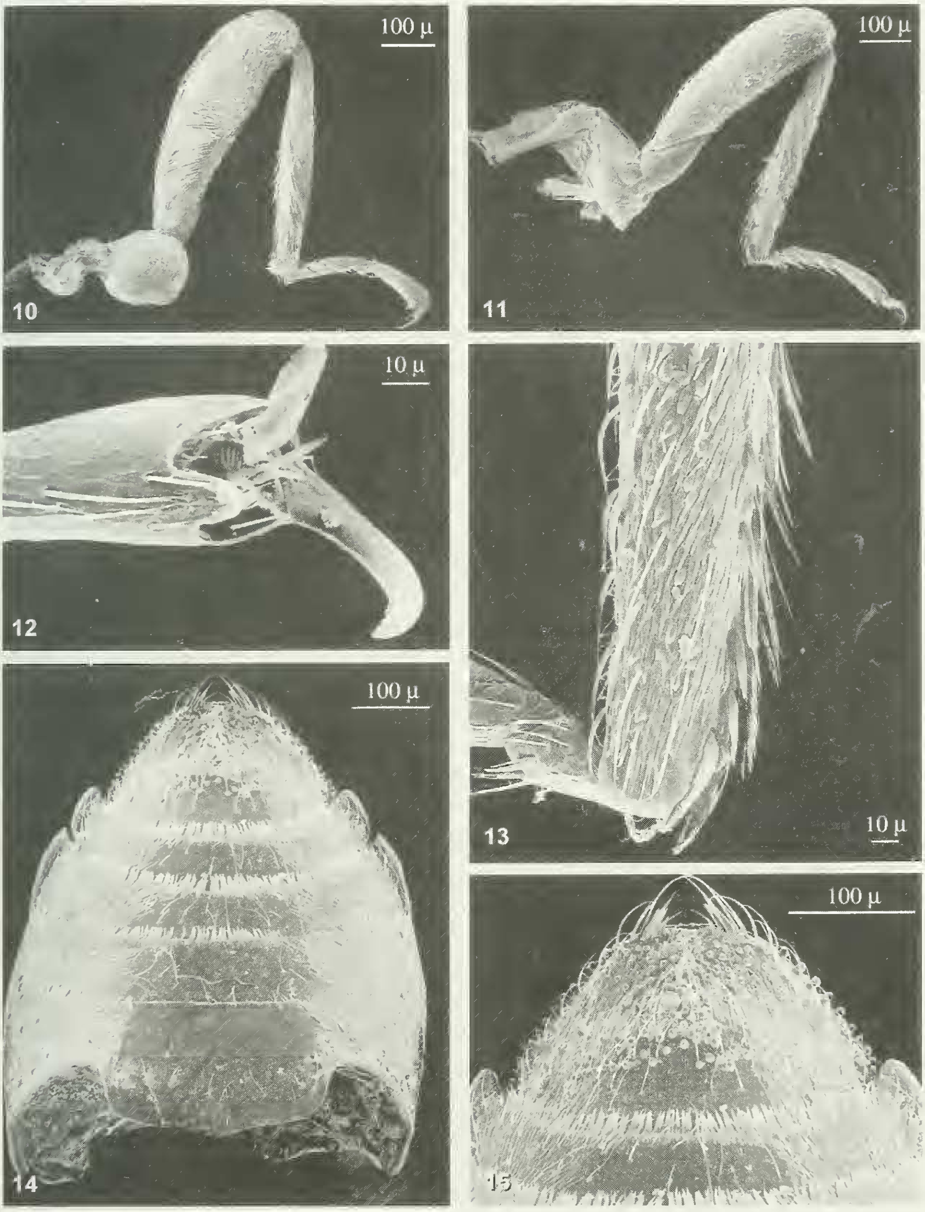


FIGS 2-9

Okalia globosa sp. n., SEM: 2) head, lateral view; 3) head, dorsal view; 4) head, ventral view; 5) prothorax, legs removed, ventrolateral view; 6) meso- and metathorax, legs partly removed, ventral view; 7) elytron, lateral view; 8) elytral apex, dorsolateral view; 9) plastron setae of elytron intermixed with pointed granules, dorsolateral view.

interval 5 with densely spaced granules lengthwise from anterior tenth/third to elytral apex; sixth interval with scattered granules anteriorly and entirely granulate posteriorly; seventh granulate along whole length; shoulders absent in wingless specimens, prominent in winged specimens. Epipleura widest anteriorly, inflected and slightly narrowed at level of metacoxa, concealed by lateral projection of ventrites 3 and 4, effaced at truncated apical portion. Hind wing about 1.3 times as long as TL, weakly pigmented, with strongly reduced venation in medial and anal fields. Legs (Figs 10-11) shorter than elytra and pronotum combined, surface granulate and setose. Femora nearly as long as pronotum, moderately expanded and feebly grooved distally; mesofemur shorter than pro- and metafemur; pro- and mesofemur with dense adpressed, long setae at proximal half on inner face; each femoral attachment of trochanter strongly oblique, base of each femur separated from coxa. Tibiae subequal in length with femora, straight and simple. Protibia (Fig. 18) with dense, long, apically bifid setae lengthwise of distal two thirds on anterior face, and with a few similar setae on posterior face, setae parallel to tibia; row of widely spaced peg-like setae situated ventrolaterally of bifid setae; few peg-like, conspicuous setae near tibial spur; tibial spurs curved, stout; area between spurs with two stout curved peg-like setae. Meso- and metatibia (Fig. 13) with area of bifid setae slightly shorter than on protibia, mesotibial bifid setae on anterior and posterior face, metatibial bifid setae on posterior face only; setae bordered by row of widely spaced, stout peg-like setae ventrolaterally, peg-like setae nearly perpendicular to tibia. Tarsi five segmented (Figs 19-20), moderately shorter than tibia; surface reticulated; terminal tarsomere as long as combined length of preceding segments; segments 1-4 with a few peg-like, stout setae ventrally and with a few hair-like setae laterally and dorsally; terminal segment with hair-like setae only. Claws shorter than half of terminal segments, moderately curved, similar each other in form and angle of inclination; empodium with two short setae (Fig. 12).

Abdomen (Fig. 14) with five ventrites; ventrites strongly sclerotized, moderately convex, separated by sutures; ventrites 1-3 connate; laterosternites of ventrite 1 highest, those of ventrites 2-4 slightly lower, laterosternites of ventrite 5 moderately high on anterior half and gradually effaced posteriad; lateral margins of ventrites 1, 2 simple, of ventrites 3 and 4 projecting, those of ventrite 5 with numerous small projections; abdominal intercoxal process wide and short, with margins flat; admedian carinae of ventrite 1 very fine and short, not reaching posterior margin; ventrite 5 (Fig. 15) with numerous irregularly spaced granules, posterior margin widely rounded to nearly truncate, with two clusters of stronger setae laterally. Spiracles of segments 1-7 in pleural membranes, sixth and seventh very close to laterosternite with terminal portion of trachea strongly expanded. Sternite 8 (Figs 28, 30) in both sexes with median strut long, reaching posterior margin of ventrite 1; tergite 8 (Figs 27, 29) less sclerotized, simple. Segment 9 in male (Fig. 35) forms genital capsule surrounding aedeagus; posterior portion well sclerotized, surrounding phallobasis and basal portion of aedeagus (in extruded position), posterior margin rounded; anterior extension forming strongly asymmetrical median strut; paraprocts narrow, rod-like, asymmetrical. Segment 9 in female forms part of ovipositor, proctiger membranous with two rod-like lateral sclerotizations. Aedeagus (Figs 33-34) strongly sclerotized, nearly as long as abdomen, tubular, without parameres, abruptly constricted apically, apex



FIGS 10-15

Okalia globosa sp. n., SEM: 10) fore leg, anterior face; 11) middle leg, posterior face; 12) terminal tarsomere of middle leg, ventral view; 13) metatibia, anterior face; 14) abdomen, ventral view; 15) abdominal apex, ventral view.

arrowhead-like; ventral sac present at distal portion of aedeagus, lacking corona, with two longitudinal lateral sclerotizations; endophallus with numerous small spinules; phallobasis short, strongly asymmetrical basally. Ovipositor tubular (Fig. 31), subequal in length with combined length of ventrites 3-5; vulva between base of coxites; valvifer strengthened by longitudinal bar-like sclerotization mesally; coxite divided by transverse line ventrally, ventral portion with transverse sclerotizations, apical portion (Fig. 32) strongly produced laterad; stylus short, curved, with apical sensilla. Female internal genital tract*: vagina elongate, simple; bursa copulatrix enlarged, saccular, with sclerotized armature; spermatheca with two branches (Fig. 36).

ETYMOLOGY. Named in honour of our friend, Dr Ilja Okáli from the Slovak National Museum, Bratislava, one of Slovakia's most renowned entomologist, who passed away on October 11, 2002 at the age of 68. The name is of feminine gender.

DISTRIBUTION. So far known only from Peninsular Malaysia and Sabah.

COMPARATIVE NOTES. All Macronychini share a reduced number of antennomeres from ten to six, as well as parameres reduced to the different extent. Classification of Macronychini (the tribe contains 21 genera) is not simple and except of number of antennal segment based also on position and extent of plastron, carination or granulation of elytral intervals, segmentation of labial palpi, presence or absence of pronotal grooves and carinae, number of elytral striae, modification of femora, as well as form of genitalia. Hind wings are not used in systematics of Macronychini because of greatly reduced venation and existence of numerous wingless species. Generally, intraspecific wing polymorphism, correlated with subsequent changes of elytral form, is well known in Elminae.

Within Macronychini, 14 genera share eight-segmented antennae. Five of these genera (*Aulacosolus*, *Graphosolus*, *Indosolus* Bollow, *Loxostirus* Jäch & Kodada and *Nesonychus* Jäch & Boukal) possess two-segmented labial palpi. Remaining nine genera (*Cuspidevia* Jäch & Boukal, *Jilanzhunychus* Jäch & Boukal, *Macronevia*, *Okalia*, *Paramacronychus* Nomura, *Rhopalonychus* Jäch & Kodada, *Urumaelmis* Satô, *Zaitzevia* Champion and *Zaitzeviaria* Nomura) bear three-segmented palpi. Within the genera with three-segmented palpi *Okalia*, *Macronevia* and some *Zaitzeviaria* spp. have pronotum without medial pronotal groove (medial groowe is more or less deeply impressed in remaining genera). *Okalia* differs from *Macronevia* and *Zaitzeviaria* (among others subtle characters) in elytra being carinate on intervals 5, 6 and 7 and in elytral plastron located between lateral margin and interval 5 (in *Macronevia* elytra carinate on intervals 5 and 6, in *Zaizeviaria* on intervals 7 and 8, and elytral plastron is between lateral margin and interval 7 in both genera).

From the genera with medial pronotal groove (*Cuspidevia, Jilanzhunychus, Paramacronychus, Rhopalonychus, Urumaelmis, Zaitzevia* and some *Zaitzeviaria* spp.), *Okalia* is most similar to *Rhopalonychus* in the morphology of aedeagus, obsolete elytral striae and scarcely punctate surface. However, *Okalia* differs from *Rhopa-*

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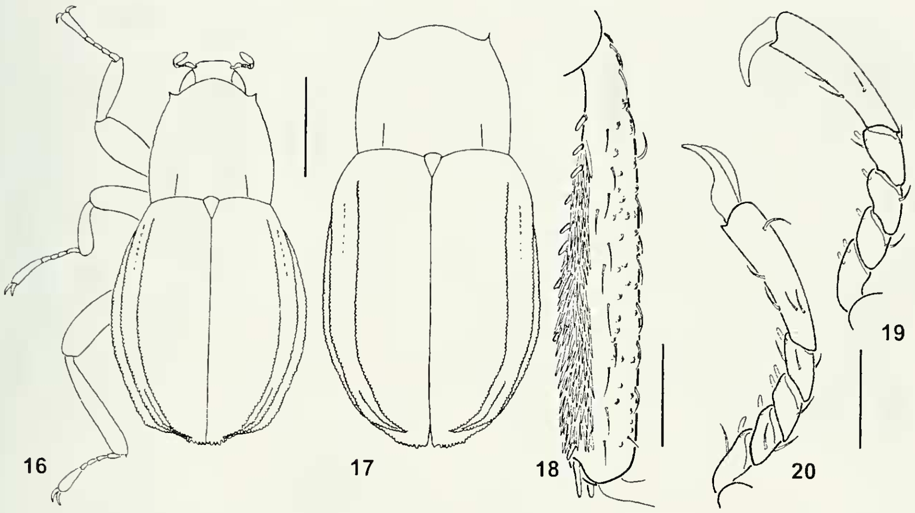
*The description of internal genital tract is based only on dry, cleared females. The preparations for study of spermathecal duct, common oviduct and other possible glandular structures, were not optimal and it is possible that some additional structures are missing in the illustration and description.



Figs 16-20

Okalia globosa sp. n.: 16) outline of wingless specimen, dorsal view; 17) outline of winged specimen, legs and head not illustrated, dorsal view; 18) mesotibia, posterior face; 19) protarsus, lateral view; 20) mesotarsus, lateral view. Scales: 0.5 mm (Figs 16, 17), 0.1 mm (Figs 18-20).

lonychus in: (1) elytral interval 5 granulate nearly entirely, interval 6 granulate posteriorly and interval 7 granulate entirely; (2) elytral plastron between lateral margin and interval 5; (3) pronotum with plastron anterolaterally; (4) pronotum without medial groove; (5) elytral apices obliquely truncate; (6) femora not strongly clavate.

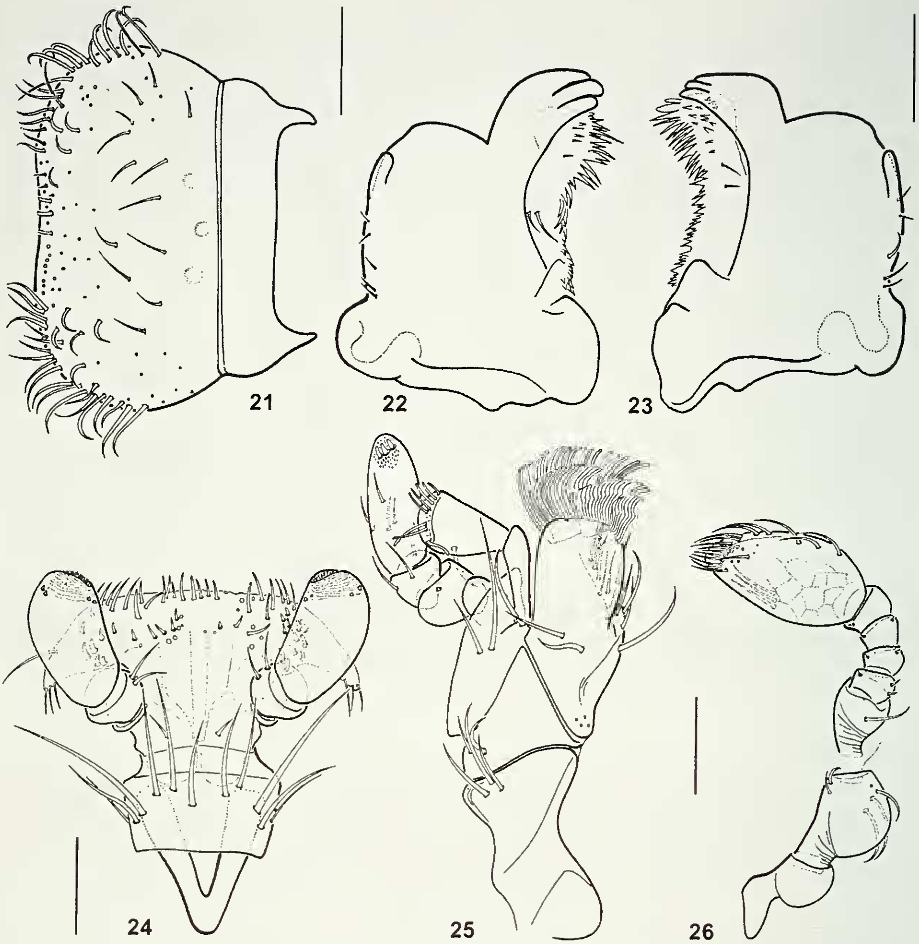
Okalia globosa sp. n.

Type locality: Malaysia, Pahang, Kuala Lipis environment, Kenong Rimba Park, Kesong river. At the collecting site, the river is 7-10 m wide and 0.3-0.9 m deep, slowly flowing through primary forest, with substrate containing sand, gravel, submerged wood and dense macrophytes.

Type material: Holotype ♂ (NMW): "Malaysia, Pahang, Kuala Lipis env., Kenong Rimba Park, Kesong river, 5. VI. 2001 J. Kodada & F. Čiampor lgt.". Paratypes 4 ♂♂, 4 ♀♀, 2 specimens sex not examined (CKB, NMW, NHMG): with same data as holotype.

Description (of wingless specimens). Habitus (Figs 1, 16). Body form widely obovate, about 1.9 times as long as wide (TL/MW). Length (TL) in ♂♂: 1.30-1.38 mm, in ♀♀: 1.44-1.48 mm; maximum width (EW) ♂♂: 0.72-0.75 mm, in ♀♀: 0.74-0.76 mm. Colour black except for reddish-brown femora and tibiae, tarsi and antennae yellowish.

Head. Labrum about 2.4 times as wide as long; surface scarcely, weakly punctate on anterior half and finely reticulate on posterior half. Frons finely punctate and granulate; granules pointed, widely and irregularly spaced; interocular distance longer than longitudinal diameter of eye; HW in ♂♂ 0.27-0.30 mm, in ♀♀ 0.30-0.31mm.



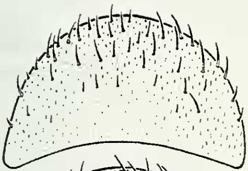
Figs 21-26

Okalia globosa sp. n.: 21) labrum, dorsal view; 22) left mandible, dorsal view, 23) right mandible, dorsal view; 24) labium, ventral view; 25) right maxilla, ventral view; 26) antenna, ventral view. Scales: 0.05 mm.

Thorax. Pronotum: AW in ♂♂: 0.32-0.33 mm, in ♀♀: 0.33-0.35 mm; PW ♂♂ 0.45- 0.48 mm, in ♀♀: 0.46-0.49 mm; PL ♂♂: 0.45-0.46 mm, in ♀♀: 0.45-0.48 mm; disc convex, sparsely and finely punctate, punctures distinctly smaller than facets, interstices glabrous; sublateral carinae very thin, confined to posterior fifth of pronotum;

Figs 27-36

Okalia globosa sp. n.: 27) male tergite 8, dorsal view; 28) male sternite 8, ventral view; 29) female tergite 8, dorsal view; 30) female sternite 8, ventral view; 31) ovipositor with bursa copulatrix, ventral view; 32) same, apical portion, ventral view; 33) aedeagus, ventral view; 34) same, lateral view; 35) male genital segments, ventral view; 36) spermatheca. Scales: 0.1 mm (Figs 27-31, 33-36), 0.05 mm (Fig. 32).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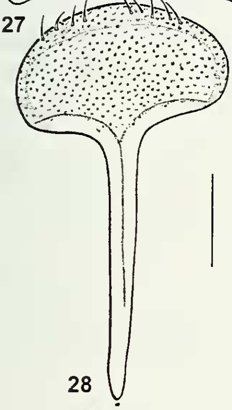
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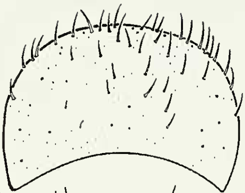
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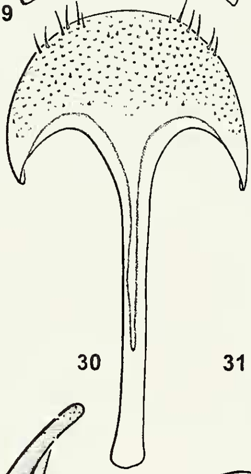
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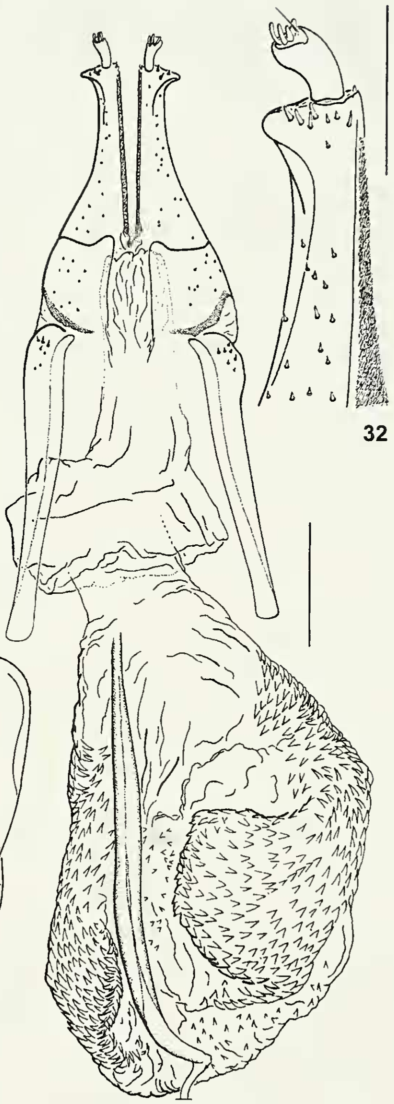
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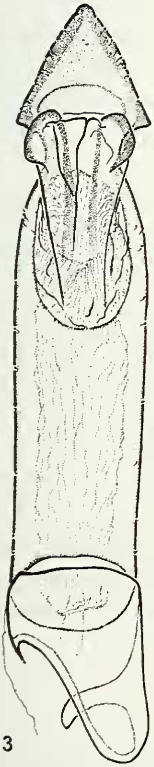
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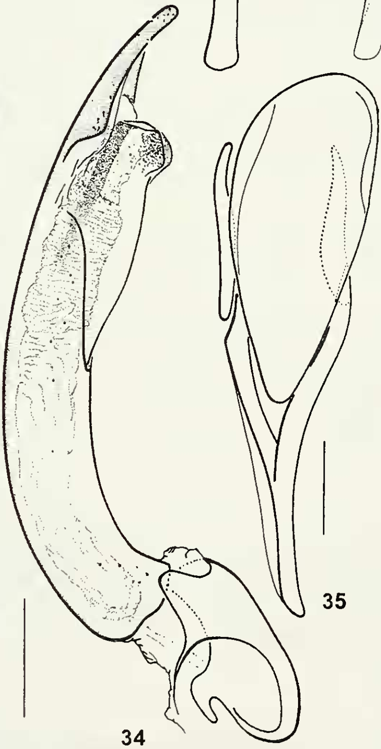
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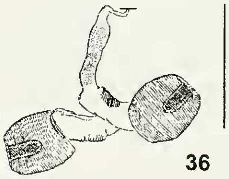
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posterior angles finely rugosely punctate; plastron area nearly triangular, situated on each side of midline, widest anteriorly, not reaching midlength. Elytra obovate, without shoulders, widest near middle, highest near anterior third (Fig. 7); strial punctures fine, but distinctly larger than punctures of intervals, widely spaced; interval 5 lengthwise with densely arranged granules from anterior tenth to apex; EL in ♂♂: 0.87-0.93 mm, in ♀♀: 0.97-0.98 mm.

Abdomen. Abdominal intercoxal process (Fig. 14) about 3 times as wide as long; anterior portion with irregular fine longitudinal furrows; posterior portion with a few fine and very sparse punctures. Ventrite 5 with densely arranged granules mainly near middle (Fig. 15). Sternite 8 (Figs 28, 30) with long median strut; tergite 8 simple (Figs 27, 29). Male segment 9 with short asymmetrical median strut, paraprocts narrow, rod-like, asymmetrical (Fig. 35). Aedeagus (Figs 33, 34) about 0.65 mm long, bent more strongly basally than apically (lateral view), abruptly constricted near apex; ventral sac confined to apical half of aedeagus, longitudinal lateral sclerotizations short, not reaching middle; phallobasis about 0.3 times as long as aedeagus. Ovipositor (Figs 31, 32) with valvifer subequal in length to combined length of coxite and stylus. Female internal genital tract (Fig. 36): vagina elongate, without sclerotized structures; bursa copulatrix enlarged, saccular as long as ovipositor, with mesal longitudinal sclerite and numerous short spinules; spermatheca with two branches.

WINGED SPECIMEN. The single winged female is 1.42 mm long (TL) and 0.70 mm wide (EW); it differs from wingless specimens in elytra nearly parallel-sided with shoulders prominent (Fig. 17).

ETYMOLOGY: from Latin *globosus* (globular, spherical); named in reference to globular body shape of wingless specimens.

DISTRIBUTION. So far known only from Peninsular Malaysia.

Okalia sp.

MATERIAL EXAMINED: 1 ♀ (CKB): "Malaysia, Sabah, ca. 25 km Sapulut, Sabalangang river, 21. V. 2001, J.F. Kočiam lgt."

DISCUSSION. The single available specimen from Sabah is a winged female which differs from winged female of *Okalia globosa* in: (1) larger size (TL: 1.58 mm, EW: 0.82 mm); (2) less distinct strial punctures and in (3) interval 5 being granulate from anterior third. As long as males are unknown we refrain from a description.

ACKNOWLEDGEMENTS

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